ITS Radiocommunications Standards and Development in Japan

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ITS Radiocommunications in Japan

ITS applications using radiocommunications: VICS, ETC, ITS Spot and Automotive Radar
ITS and Government of Japan

The Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society

- Director: Prime Minister Shinzo Abe
- Administration: Cabinet Secretariat

Ministry of Internal Affairs and Communications
National Police Agency
Ministry of Economy, Trade and Industry
Ministry of Land, Infrastructure, Transport and Tourism

“Declaration to be the World’s Most Advanced IT Nation” (June 14, 2013)

The number of traffic accident fatalities will be reduced to less than 2,500 by about 2018. Also, the world’s safest road transportation will be created (the world’s lowest rate of traffic fatalities compared to population) and traffic congestion will be greatly reduced by 2020.
700 MHz band ITS

Example Services (drives on the left)

[I2V, V2V] Left-turn collision with motorcycle prevention system

[I2V, V2V] Right-turn collision prevention system

[I2V] Crossing pedestrian recognition enhancement system

[V2V, I2V] Crossing collision prevention system

[V2P] Pedestrian existence advisory system
1. Innovative ASV demonstration in Hiroshima, Japan
   - LRV and automobile cooperation -
     • University of Tokyo
     • Hiroshima Electric Railway Co., Ltd.
     • National Traffic Safety and Environment Laboratory
     • Mazda Motor Corporation

2. Driving Safety Support Systems FOT in Toyota City, Japan
   –for driver support systems–
   UTMS Society of Japan and Toyota Motor Corporation

Roadside sensors detect objects and notify drivers nearby via 700MHz radio waves to ensure their safety.
700MHz band ITS: Future action

Studying…

Term: 2014-2016
Budget: 2014 $2.1M
2015, 2016 TBD

Application
On-board device
Security
Interoperability test
Message set

Field Operation Tests

MIC starts FOTs in support of early deployment of 700MHz ITS in 2014.
79GHz band High-Resolution Radar

ITU-R Recommendation M.1452-2
“Millimeter wave vehicular collision avoidance radars and radiocommunication systems for intelligent transport system applications”

◆ Pursuit of Higher Resolution and Longer Distance for detecting potential accidents

**[Radar Standards in Japan]**

<table>
<thead>
<tr>
<th>Type of Radar</th>
<th>Frequency (Max)</th>
<th>Bandwidth (Max)</th>
<th>Output Power</th>
<th>Antenna Gain</th>
<th>Resolution</th>
<th>Measurement Distance</th>
<th>Operation Permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWB</td>
<td>22—29 GHz</td>
<td>4750 MHz</td>
<td>-41.3 dBm/MHz</td>
<td>—</td>
<td>20cm</td>
<td>30 m</td>
<td>22 – 24.25 GHz: Until 2016</td>
</tr>
<tr>
<td>76 GHz</td>
<td>76—77 GHz</td>
<td>500 MHz</td>
<td>10 mW</td>
<td>40 dBi</td>
<td>1 – 2m</td>
<td>200 m</td>
<td>No time limit</td>
</tr>
<tr>
<td>79 GHz</td>
<td>[77—81] GHz</td>
<td>4 GHz</td>
<td>10mW</td>
<td>35dBi</td>
<td>20cm</td>
<td>70 m</td>
<td>No time limit</td>
</tr>
</tbody>
</table>

79GHz radar can detect and identify smaller obstacles within any range and it has become available in Japan since Dec 2012.
New high-resolution radar uses 4 GHz bandwidth in 77-81 GHz. Global spectrum allocation for the radar should be considered at WRC-15.
ITS in ITU-R

Study Period: 2012 - 2015

ITU

ITU-R

ITU-T

ITU-D

WRC

RA

SG1

SG5

WP5A

WP5B

WP5C

WP5D

SG 7

JTG4-5-6-7

Radiocommunications Assembly

Terrestrial Services (Dr. Hashimoto, Japan)

Land Mobile Services (Dr. Costa, Canada)

Cognitive radio
(Dr. Matinmikko, Finland)

New Technology
(Dr. Yoshino, Japan)

ITS
(Mr. Oyama, Japan)

World Radio Conference

SG: Study Group
WP: Working Party
WG: Working Group

International Telecommunication Union
Cooperation between Europe and Japan

ETSI - ITS Forum

JARI* reviews
ETSI standards
(Japan, Feb 2013)

CAM:
Co-operative Awareness Messages

DENM:
Decentralized Environmental Notification basic Service Message

Create ITU-R recommendation
(May 2013)

ITU-R Recommendation M.[V2X]
“Radio interface standards of V2V and V2I communication for ITS applications”

* JARI: Japan Automobile Research Institute
**5.8GHz band Interference study: ETC/ITS Spot**

ETC and ITS Spot are essential nowadays in Japan

- ETC in Japan: in service since March 2001 (ITS Spot service March 2011)
- ETC & ITS Spot:
  - **OBU**: 58.5 million
  - Popularity on toll roads: **89.3%** (7 million vehicles per day)  
  Source: MLIT website

The *radio interferences* on **5.8GHz** may make these systems less reliable and become a serious issue in Japan, other Asia-Pacific regions (Region 3), and even Europe (Region 1).

Possible cases having an interference

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Case 1
- Desired signal: Down
- Interference signal: AP or ST (In vehicle)
Summary

1. ITS radio communications have been developing in accordance with the New ICT Strategy

2. 700MHz ITS: V2I and V2V services to be introduced in Japan soon

3. 79GHz high-resolution automotive radar to be deployed worldwide after WRC-15

4. ITU-R: ITS related issues have been reviewed under international cooperation

5. Europe and Japan have been working together toward the next generation ITS
21st ITS World Congress

“Reinventing Transportation in our Connected World”

September 7 - 11, 2014  Cobo Center, Michigan  http://itsworldcongress.org

Executive Session:
ITS radiocommunication Today & Future

Special Interest Session (Proposed):
Radiocommunication Technologies for Advanced ITS

MIC keenly participates in the ITS World Congress in Detroit.